CLAIMS

1. A polycarboxylic acid copolymer which is obtained by copolymerization of monomer components comprising a polyalkyleneimine unsaturated monomer (A1) and an unsaturated carboxylic acid monomer (B).

2. The polycarboxylic acid copolymer according to Claim 1, wherein said polyalkyleneimine unsaturated monomer (A1) has an oxyalkylene group.

3. A polycarboxylic acid copolymer which is obtained by copolymerization of monomer components comprising a polyalkylene glycol unsaturated monomer (A2) having a structure such that an oxyalkylene group is bound to a polyhydric alcohol residue, and an unsaturated monocarboxylic acid monomer (B').

4. A polycarboxylic acid copolymer which is obtained by copolymerization of monomer components comprising a hydroxyl-terminated, polyalkylene glycol unsaturated monomer (A2') having a structure such that an oxyalkylene group is bound to a polyhydric alcohol residue, and an unsaturated carboxylic acid monomer (B).

5. The polycarboxylic acid copolymer according to Claim 1, wherein said monomer components comprise a polyalkylene glycol unsaturated monomer (A3) other than said monomer having an oxyalkylene group.

6. The polycarboxylic acid copolymer according to Claim 3, wherein said monomer components comprise a

polyalkylene glycol unsaturated monomer (A3) other than said monomer having an oxyalkylene group.

7. The polycarboxylic acid copolymer according to Claim 4,

wherein said monomer components comprise a polyalkylene glycol unsaturated monomer (A3) other than said monomer having an oxyalkylene group.

8. A method of producing a polycarboxylic acid copolymer

which comprises copolymerizing monomer components comprising a monomer (A) having an oxyalkylene group and an unsaturated carboxylic acid monomer (B) using a hydrophobic chain transfer agent.

9. The method of producing a polycarboxylic acid copolymer according to Claim 8,

wherein said hydrophobic chain transfer agent comprises a thiol chain transfer agent having a hydrocarbon group containing not less than 3 carbon atoms.

10. A polycarboxylic acid copolymer

which is obtained by the method of producing a polycarboxylic acid copolymer according to Claim 8.

11. A cement additive

which comprises the polycarboxylic acid copolymer according to Claim 1.

12. A cement additive

which comprises the polycarboxylic acid copolymer according to Claim 3.

13. A cement additive

which comprises the polycarboxylic acid copolymer according to Claim 4.

14. A cement additive

which comprises the polycarboxylic acid copolymer according to Claim 10.

15. A cement additive

which has a calcium transfer value of 10 to 900 mPa·s and/or a cement performance coefficient of 0.05 to 1.0.

16. A cement additive

which has, when purified following adjustment to pH 12 to 12.5, a nitrogen content of 0.1 to 20% by weight as determined by elemental analysis,

allows detection of morpholine, 4-(2-hydroxyethyl)morpholine and 1,4-dioxane upon pyrolysis GC-MASS,

shows a peak having no shoulder in GPC,

has a weight average molecular weight (Mw) of 5,000 to 300,000,

shows, in IR measurement, an absorption peak at 1640 to 1660 cm^{-1} whose intensity is not more than 20% of the intensity of the absorption peak occurring at 1710 to 1630 cm^{-1},

allows detection, in ^{13}C-NMR, of signals at chemical shift positions of 60 to 61 ppm and 69 to 68 ppm,

has an NMR-PEG content of 10 to 99% by weight and

has a TCAV of 3 to 900 mg KOH/g.

17. A cement composition

which comprises at least water, cement and a cement additive,

the cement additive according to Claim 11 being used as said cement additive.

18. A cement composition

which comprises at least water, cement and a cement additive,

the cement additive according to Claim 14 being used as said cement additive.

19. A cement composition

which comprises at least water, cement and a cement additive,

the cement additive according to Claim 15 being used as said cement additive.

20. A cement composition

which comprises at least water, cement and a cement additive,

the cement additive according to Claim 16 being used as said cement additive.